



US006336129B1

(12) **United States Patent**
Ise et al.

(10) Patent No.: **US 6,336,129 B1**
(45) Date of Patent: **Jan. 1, 2002**

(54) **PACKET TRANSFER METHOD AND NODE DEVICE USING RESOURCE RESERVATION OR PRIORITY TRANSFER CONTROL WITHOUT REQUIRING VIRTUAL CONNECTION MERGING**

(75) Inventors: **Kotaro Ise; Yasuhiro Katsube**, both of Kanagawa (JP)

(73) Assignee: **Kabushiki Kaisha Toshiba**, Kawasaki (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/205,232**

(22) Filed: **Dec. 4, 1998**

(30) **Foreign Application Priority Data**

Dec. 5, 1997 (JP) 9-335905

(51) Int. Cl.⁷ **G06F 15/16**

(52) U.S. Cl. **709/201; 709/200; 709/203; 709/205; 709/213; 709/238; 370/235; 370/397; 370/400; 370/409**

(58) **Field of Search** **709/200-205, 709/213, 223, 227-228, 232, 238-240, 244-245; 370/395-401, 409, 235**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,557,611 A * 9/1996 Cappellari et al. 370/395
5,734,652 A * 3/1998 Kwok 370/395
5,862,329 A * 1/1999 Aras et al. 709/204
5,892,924 A * 4/1999 Lyon et al. 709/245
5,920,705 A * 7/1999 Lyon et al. 709/240
6,041,037 A * 3/2000 Nishio et al. 370/228
6,055,561 A * 4/2000 Feldman et al. 709/200
6,094,431 A * 7/2000 Yamato et al. 370/395
6,167,051 A * 12/2000 Nagami et al. 370/397
6,185,213 B1 * 2/2001 Katsube 370/397

OTHER PUBLICATIONS

R. Braden et al., "Resource ReSerVation Protocol (RSVP)—Version 1 Functional Specification", Internet RFC 2205, Sep. 1997, pp. 1-112.

A. Viswanathan et al., "Soft State Switching: A proposal to extend RSVP for switching RSVP flows", IETF Draft, Aug. 1997, pp. 1-13.

* cited by examiner

Primary Examiner—Zarni Maung

Assistant Examiner—Bharat Barot

(74) *Attorney, Agent, or Firm*—Foley & Lardner

(57) **ABSTRACT**

A packet transfer method at a node device in which the virtual channel merging is unnecessary at the label switch router even when the communication resource reservation or the high priority transfer is requested is disclosed. At each node, one or more virtual channels for a specific flow are set up toward all receivers regardless of whether each receiver requested a communication quality for the specific flow or not, upon receiving a message used in a procedure for reserving the communication quality for the specific flow that is transmitted from an upstream side to a downstream side on a route of the specific flow toward the receivers. Else, at each node, one virtual channel for a specific flow is set up toward at least one receiver, and transmitting messages indicating a need to set up virtual channels for the specific flow toward other receivers on a downstream side, upon receiving a message for requesting a communication quality for the specific flow that is transmitted from that at least one receiver to the sender toward an upstream side, such that a separate virtual channel set up procedure for setting up virtual channels for the specific flow toward the other receivers is activated among nodes on a route of the specific flow. Then, at each intermediate node, a transfer processing at a layer lower than a network layer is carried out according to a corresponding among the virtual channels.

20 Claims, 12 Drawing Sheets

